

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference LU6145	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/EP2004/013827	International filing date (day/month/year) 06.12.2004	Priority date (day/month/year) 10.12.2003	
International Patent Classification (IPC) or national classification and IPC C08F10/08, C08F4/64, C07F17/00, C07F7/08			
Applicant BASELL POLYOLEFINE GMBH et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 04.11.2005		Date of completion of this report 07.02.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Elliott, A Telephone No. +49 89 2399-8218 	

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/013827

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-54 as originally filed

Claims, Numbers

1-11 received on 08.11.2005 with letter of 04.11.2005

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/013827

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-11
	No: Claims	-
Inventive step (IS)	Yes: Claims	1-11
	No: Claims	-
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	-

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

The following documents are mentioned in the International Search Report:

- D1: BRYLIAKOV K P ET AL: "Ansa-titanocene catalysts for alpha -Olefin polymerization. Syntheses, structures, and reactions with methylaluminoxane and boron-based activators" ORGANOMETALLICS, vol. 24, no. 5, 28 February 2005, pages 894-904
- D2: KLAPPER M ET AL: "New organic supports for metallocene catalysts applied in olefin polymerizations" MACROMOLECULAR SYMPOSIA, vol. 213, June 2004, pages 131-145
- D3: WO 2004/050724 A (BASELL POLYOLEFINE GMBH) 17 June 2004
- D4: WO 99/52955 A (RIEGER, BERNHARD) 21 October 1999
- D5: WO 99/52950 A (RIEGER, BERNHARD) 21 October 1999
- D6: WO 99/46270 A (THE DOW CHEMICAL COMPANY) 16 September 1999
- D7: WO 99/43717 A (TARGOR GMBH) 2 September 1999
- D8: HALTERMAN R L ET AL: "Synthesis and structure of [1,2-bis(1-indenyl)benzene]titanium and zirconium dichlorides" JOURNAL OF ORGANOMETALLIC CHEMISTRY, vol. 568, no. 1-2, 15 October 1998, pages 41-51
- D9: EP-A-0 728 773 (MITSUBISHI CHEMICAL CORPORATION) 28 August 1996
- D10: SCHLOEGL, MARTIN ET AL: "Semi-hydrogenated, asymmetric metallocene catalysts for the propylene polymerization" ZEITSCHRIFT FUER NATURFORSCHUNG, B: CHEMICAL SCIENCES, vol. 58, no. 6, 2003, pages 533-538

Re Item V.

Novelty

The presently claimed subject-matter is to be regarded as novel over the prior art cited in the International Search Report as claim 1 has the characterising feature that "if R^3 is hydrogen then R^5 is an organic radical which has from 3 to 20 carbon atoms and is branched in the alpha-position and R^6 is hydrogen." This proviso therefore excludes certain compounds on pages 8 and 9 of D6, the compound dimethylsilanediyibis(2-methyl-benzo-indenyl)zirconium dichloride from D7 and the complex prepared starting from compound 14 in D8.

Inventive Step

An inventive step can be recognised for the following reasons: the subject-matter of the present application being regarded as new, the object of the present application is to be seen as the provision of new metallocenes which make possible the preparation of propylene-ethylene copolymers having an increased molar mass compared to those prepared with

previously known metallocenes and at the same time maintaining or increasing the desired stiffness of a propylene homopolymer which is used as the matrix in which the propylene-ethylene copolymer is dispersed.

The presently-claimed metallocenes are generically disclosed in D4 (cf. D4, claim 13). The metallocene prepared in the examples of D4 is 1-(9-fluorenyl)-2-(1-(5,6-cyclopenta-2-methyl)indenyl)ethyne zirconocene dichloride. This prepares a propylene polymer with a melting point of roughly 50°C (see table 1). The metallocenes according to the present application produce completely different polypropylenes with melting points of roughly 150°C - there is no such teaching in D4.

D9 is a further document which appears to generically disclose the presently-claimed metallocenes (cf. D9, claim 3, the definition for A and A' 2-methylbenzindenyl. Although not clear in claim 3 what the actual structure of the benzindenyl is (could be 4,5 condensed or 5,6 condensed, the numbers referring to the positions on the indene where the benzene is attached) but the examples of D9 only mention the 4,5 condensed compounds (cf. D9, Table 2 on page 26, component (A) used in example 16). Hence if the 4,5 compound is meant, the teaching of D9 leads away from the presently-claimed compounds. Alternatively, one could read claim 3 as meaning either of the 2 different structures for the benzindenyl which gives rise to the generic overlap between D9 and the presently-claimed subject-matter. What is not taught, however, in D9 is the particular substitution on R⁵ when R³ is hydrogen. Additionally, from the objective of D9 which was "to provide a polyolefin having a good particle property", the skilled person would not see D9 as providing an obvious solution to the problem posed in the present application. For these reasons, an inventive step can also be acknowledged over D9.

Re Item VI.

Documents D1-D3 are all not to be considered prior art according to Rule 64.3 PCT as they were published after the priority date claimed for the present application, D2 and D3 being made available during the priority interval and D1 being published after the present application's filing date. The relevance of D2 will depend upon the validity of the priority claimed for the present application and that of D3 will depend additionally upon D3's priority validity and whether or not D3 enters the respective regional phases.

D1, being non-patent literature, will not be relevant for the proceedings to come but has been cited as it discloses in column 2 on page 902 the species $\text{rac-Me}_2\text{Si}(2\text{-Me-Benzind})_2\text{TiMe}_2$. D2 discloses $\text{Me}_2\text{Si}(2\text{MeBenzInd})_2\text{ZrCl}_2$ as a catalyst for olefin polymerisation supported on an organic support. In the compounds of these 2 documents the "benz" would appear to be condensed to the 4,5 positions of the indene - the documents are therefore not considered to affect the opinion expressed above in section V.

D3 clearly shows in claim 5 thereof metallocenes falling under the scope of those presently claimed and the corresponding ligands in claim 8. D3 is related to polybutene production and would not appear to contain any specific compounds falling under the presently-claimed scope.

Re Item VII

Documents D4-D10 should be briefly commented upon in the description (Rule 5.1(a)(ii) PCT).

Due to the minor amendments made to the claimed subject-matter, the description is no longer in conformity with the claims.

Re Item VIII

During the search, a number of hits which seemed novelty-destroying in the databases REGISTRY and CAPLUS were not to be regarded as novelty destroying as the indexers at Chemical Abstracts seem to consider 4,5-benzoindenyl (benz(e)indenyl) to be the same as 5,6-benzoindenyl (benz(f)indenyl)! This became obvious upon reading the fulltext of the articles upon which the seemingly pertinent Chemical Abstracts' abstracts and structures were based.